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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,922	12/07/2004	Michael Hesse	53620	7432
26474	7590	09/12/2006		
NOVAK DRUCE DELUCA & QUIGG, LLP 1300 EYE STREET NW SUITE 400 EAST TOWER WASHINGTON, DC 20005				
EXAMINER GALE, KELLETTE				
ART UNIT		PAPER NUMBER		
1621				

DATE MAILED: 09/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/516,922

**Applicant(s)**

HESSE ET AL.

**Examiner**

Kellette Gale

**Art Unit**

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 27-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 27-30, 32-39, 41, 45, 48 and 50-55 is/are rejected.
- 7) ☐ Claim(s) 31, 40, 42-44, 46, 47 and 49 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities: on page 26, line 6 of the specification, "BSA" has not been defined. Appropriate correction is required.

The abstract of the disclosure is objected to because it exceeds the requirement for no more than 150 words. Also, the use of the word "said" is not proper form. Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 29 recites the limitation "the hot spot temperature" in the first line. There is insufficient antecedent basis for this limitation in the claim.

Claims 50-53 recites the limitation "the absorbent". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 27-30, 32-39, 41, 45, 48, and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budge et al (US 5,196,602).

Applicant claims a process for preparing optionally substituted 1,4-butanediol by a two stage catalytic hydrogenation in the gas phase of C4-dicarboxylic acids and/or of

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derivatives thereof wherein a gas stream of the C4-dicarboxylic acid or derivative thereof is introduced at a temperature of 200-300°C and from 2-60 bar into a first reactor and catalytically hydrogenating it in the phase to a product which contains mainly optionally alkyl-substituted  $\gamma$ -butyrolactone, removing succinic anhydride, and introducing the resultant product stream to a second hydrogenation stage followed by removal of intermediates, by-products, and any unconverted reactant, and optionally recycling unconverted intermediates into one or both hydrogenation stages. The catalyst is said to be free of chromium with no more than 95% CuO and no less than 5% of an oxidic support.

**Determination of the scope and content of the prior art**

**(MPEP §2141.01)**

Budge et al teaches a two stage process for hydrogenating maleic anhydride to produce 1,4-butanediol wherein the temperature in the first stage is 100-350°C with a pressure of 1-103 bar (col.3, lines 49-50, 54) and the temperature in the second stage is 180-350°C with a pressure of 51-103 bar (see abstract and col. 3, lines 59-60, 63-65). Within the process the hydrogen/maleic anhydride ratio is said to be between 20/1 and 600/1 (col. 3, line 55). The reaction uses a fixed or fluid bed reactor for continuous operation (col. 4, lines 7-10). The catalyst used may be in the form of mixed oxides comprising copper, zinc, and aluminum with supports that may comprise alumina (please see heading, "Catalyst" in col. 2).

**Ascertainment of the difference between the prior art and the claims**

**(MPEP §2141.02)**

Budge et al does not specifically teach the removal of succinic anhydride or the specific temperatures, pressures, and concentration ranges listed in the claims. Also, Budge et al does not recite the use of shaft or tube and bundle type reactors.

### **Finding of prima facie obviousness**

#### **Rational and Motivation (MPEP §2142-2143)**

Although the specification of the instant application does not specifically teach steps of how the succinic anhydride is removed from the reaction, it apparent that in the prior art, Budge et al, the succinic anhydride is removed from the reaction via the second hydrogenation stage. There are no showing of unexpected results in removing the succinic anhydride via the order of steps indicated in claim 1 as the same product is obtained. Therefore it would not only be obvious, but also, one of ordinary skill in the art would be motivated to remove succinic anhydride from the reaction mixture via a second hydrogenation stage.

It would also be obvious for one of ordinary skill in the art at the time of the instant invention to utilize any type of fixed or fluid bed reactor such as a shaft or tube and bundle reactor. One of ordinary skill in the art would be motivated to do so for various reasons such as cost and availability.

Also, please note that merely modifying the process conditions such as temperature and concentration is not a patentable modification absent a showing of criticality. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

***More 103 Rejections***

Claims 27-30, 32-39, 41, 45, 48, and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budge et al (US 5,196,602) in view of Kuksal et al (Applied Catalysis A: General, 228 (2002)).

Applicant claims a process for preparing optionally substituted 1,4-butanediol by a two stage catalytic hydrogenation in the gas phase of C4-dicarboxylic acids and/or of derivatives thereof wherein a gas stream of the C4-dicarboxylic acid or derivative thereof is introduced at a temperature of 200-300°C and from 2-60 bar into a first reactor and catalytically hydrogenating it in the phase to a product which contains mainly optionally alkyl-substituted  $\gamma$ -butyrolactone, removing succinic anhydride, and introducing the resultant product stream to a second hydrogenation stage followed by removal of intermediates, by-products, and any unconverted reactant, and optionally recycling unconverted intermediates into one or both hydrogenation stages. The catalyst is said to be free of chromium with no more than 95% CuO and no less than 5% of an oxidic support.

**Determination of the scope and content of the prior art**

**(MPEP §2141.01)**

Please see the description of the teachings of Budge et al above.

Also, Kuksal et al recites that succinic anhydride is a highly undersirable intermediate since it reacts with 1,4-butanediol to form various by-products (please see abstract, lines 12 and 13).

**Ascertainment of the difference between the prior art and the claims**

**(MPEP §2141.02)**

Budge et al does not specifically teach the removal of succinic anhydride or the specific temperatures, pressures, and concentration ranges listed in the claims. Also, Budge et al does not recite the use of shaft or tube and bundle type reactors.

**Finding of prima facie obviousness****Rationale and Motivation (MPEP §2142-2143)**

Based on the teaching of Kuksal et al and his desire to suppress the occurrence of succinic anhydride in the hydrogenation of maleic anhydride, one of ordinary skill in the art would find it obvious to remove the succinic anhydride from the intermediate reaction mixture before the second hydrogenation stage in the reaction recited by Budge et al in order to prevent the formation of unwanted by-products such as various oligo- and polyesters. One of ordinary skill in the art at the time of the instant invention would be motivated to do so in order to obtain a 1,4-butanediol product having higher purity.

It would also be obvious for one of ordinary skill in the art at the time of the instant invention to utilize any type of fixed or fluid bed reactor such as a shaft or tube and bundle reactor. One of ordinary skill in the art would be motivated to do so for various reasons such as cost and availability.

Also, please note that merely modifying the process conditions such as temperature and concentration is not a patentable modification absent a showing of criticality. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

***Allowable Subject Matter***



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Claims 31, 40, 42-44, 46-47, and 49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kellette Gale whose telephone number is (571) 272-8038. The examiner can normally be reached on M-F (6:30am-3:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on (571) 272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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August 31, 2006

  
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